

Subtraction With Regrouping

Brief Overview:

In order to understand subtraction with regrouping, student should know basic subtraction facts as specified in the NCTM Content Standards. This unit uses “Recreation” for a real world application of subtraction involving regrouping.

NCTM Content Standard/National Science Education Standard:

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
- Understand meaning of operations and how they relate to one another
- Compute fluently and make reasonable estimates

Grade/Level:

Grade 4

Duration/Length:

3 days (60 minutes per day)
Assessment is included in Day 3.

Student Outcomes:

Students will:

- Subtract up to 4-digit whole numbers with and without regrouping

Materials and Resources:

- Chart paper and a marker for the KWL chart and for Lesson 3
- Base 10 blocks for each student (10 rods and 20 units in baggies)
- Student Resource 1, Regrouping Mat, one per student
- Student Resource 2, Students in the Play, as needed
- Student Resource 3, Tickets Sold, as needed
- Student Resource 5, Skating Party, as needed
- Student Resource 6, Take Away directions, one per group
- Teacher Resource 1, Teacher Observation Checklist
- Pink and yellow index cards for the Engage activity, one set for each group
- Student Resource 4, Actions With Subtraction, one per student
- White boards and markers, or another form of Every Student Response, one per student
- Base 10 blocks

- Number cards: one 1, one 3, three 4's, three 5's, one 7, two 8's, one 9, one 13, one 17
- Place value chart for the floor (use masking tape)
- Number cards 0-9, one set per group
- Student Resource 7, Assessment, one per student

Development/Procedures:

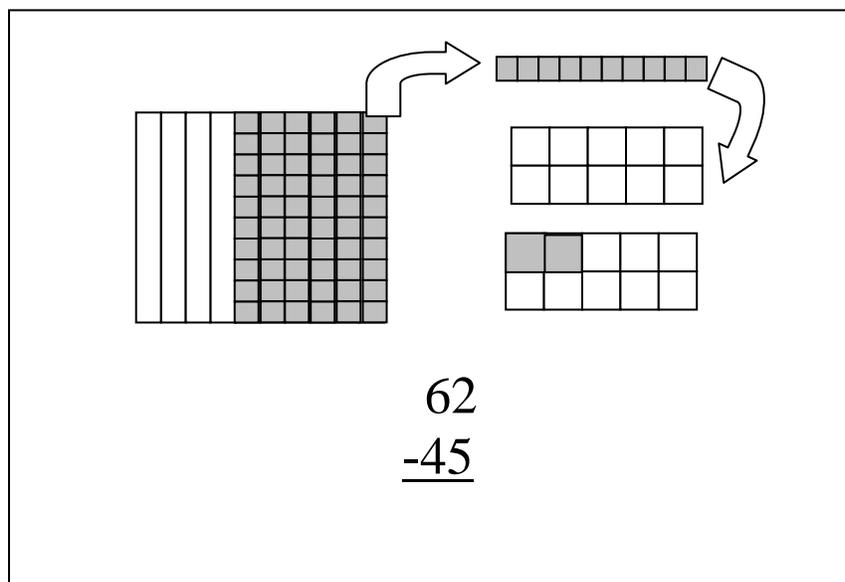
Lesson 1

Pre-Assessment /Launch

- Have a KWL chart posted for all the students to see.
- Ask the students:
 - What they **know** about subtraction and list responses under the K heading
 - What they **want** to learn about subtraction and list it under the W heading
 - Use the L heading for what the students have **learned** about subtraction at the end of the lesson as part of the assessment.

Teacher Facilitation/Student Application

- Distribute baggies of base ten blocks and Student Resource 1, Regrouping Mat, to each student.
- Note that Student Resource 2, Students in the Play, may be used for this activity.
- Present the following problem to the students:
 - 62 fifth grade students are in the school play, "The Lion King." 45 of the students in the play are girls. How many are boys?
- Explain to the students that they may solve this problem in any way.
- Observe the students while they solve the problem. Make anecdotal notes on the Teacher Resource 1, Teacher Observation Checklist.
- Have the students take a Gallery Walk to observe how others in the class solved the problem.
- Have a student volunteer explain how he/she solved the problem. Ask the students if anyone solved it in a different way (*Possible responses: Counting on, skip count and add on, using place value models, mental math*).
- Distribute the Regrouping Mat to the students. Explain that the mat will help them understand the regrouping process.
- Use the problem from the Pre-Assessment/Engage to model the use of the Regrouping Mat.
 - Place base ten blocks on the mat as indicated in the problem. Place the units for the ones place in the lower ten frame.



- Ask the students if they can take 5 ones from 2 ones. (*No.*) Model moving one rod from the flat to above the “R” ten frame, as shown in the example. Place units in the “R” ten frame, and remove the rod at the top of the mat.
- Explain the process while moving the manipulatives on the mat. “I will take a rod and place it on top of the mat so I do not forget that I am regrouping it. Now I will place ten units in the “R” ten frame and move the rod off the mat. I have now regrouped and I am able to subtract.”
- Show the students how to rewrite the numbers in the algorithm so they match the base ten model.

$$\begin{array}{r} 5 \ 12 \\ \cancel{6}2 \\ - 45 \\ \hline \end{array}$$

- Continue the subtraction process and write the difference of 17.
- Write the following problem on the chalkboard or on a transparency for the overhead projector. Have the students working with you as they perform the regrouping process as it modeled.
 - Sara’s Shop provided 81 crispy snacks and 59 fruit snacks for the students in the track meet. How many more crispy snacks than fruit snacks does Sara’s Shop have?
 - Question the students during the modeling process.
 - Ask: What is the first step in solving this problem? (*Notice that 9 ones cannot be subtracted from 1 one.*)
 - Ask: What should we do next? (*Move one rod over the “R” ten frame. Then add 10 units to the “R” ten frame and remove the rod. The trade has been completed.*)
 - Ask: How many tens and ones do we now have? (*7 tens and 11 ones*)
 - Perform the subtraction and tell your neighbor the difference. (*17*)

Lesson 2

Pre-Assessment /Launch

- Create sets of two different color cards (pink and yellow) before the students arrive to class. The pink cards have three-digit numbers written on them and the yellow cards have two-digit numbers written on them for subtracting without regrouping.
- 125 and 72 234 and 21 146 and 25 391 and 60 588 and 57 999 and 99
- Distribute sets of cards to partners. Have the students subtract their numbers and record the subtraction on individual dry erase white boards.
- Have the students explain how they determined their answers, and how they determined whether they needed to regroup to solve the problem.

Teacher Facilitation/Student Application

- Distribute Student Resource 4, Actions With Subtraction, and base ten blocks to each pair of students.
- Note that Student Resource 3, Tickets Sold, may be used for this activity.
- Display the following problem on the overhead projector:
 - There were 365 tickets sold for “High School Musical” and 275 people attended the show. How many people did not attend the show?
 - Have the students solve the problem with their partners using any method.

Problem

365

-275

90

- Have student volunteers share their methods of solving the problem.
- Model another problem using the Actions With Subtraction mat. Note that Student Resource 5, Skating Party, may be used with this problem.

- Pass each problem to the student on the right. This student will subtract the tens column.
- Pass each problem to the student on the right. This student will subtract the hundreds column.
- Pass each problem to the student on the right. The problem should be back with its owner, who will check the answer with a calculator.
- Provide the Place Value Mat for students as needed.

Embedded Assessment

Observe the students as they pass the story problems around their groups during the Round Robin. Make anecdotal notes on the Teacher Observation Checklist.

Reteaching/Extension

- Play the game, Take Away, for those students who need additional practice with subtraction with regrouping. Note that Student Resource 6, Take Away, provides a blackline master of the directions.
- In this game, students will work in teams of two. Students will roll a number cube to determine the value of the Base 10 Blocks to remove from their place value mats. They will look for a strategy for being the first team to remove all the blocks from the mat. In this activity, students will have the opportunity to use subtraction and develop strategic thinking skills.
- Students will use a place-value mat with 1 flat in the “flats” (hundreds) column. Elicit that the flat represents 1 hundred, or 100 units.
- Ask a volunteer to write any 2-digit number on chart paper.
- Tell students to think about how they can take blocks equal in value to that number from the flat on the mat.
- Establish that, in order to subtract, they will have to trade- 1 flat for 10 longs - ---then, if necessary, 1 long for 10 units.
- Have someone do the trading, taking away the blocks for the 2-digit number and then announcing the difference, or how much of the hundred is left.
- Record the action by writing the corresponding subtraction example on the board.

(Adapted from *The Super Source* {ETA/Cuisenaire})

Lesson 3

Pre-Assessment/Launch

- Write the problem $5,475 - 884$ vertically on chart paper. Use student models to solve the subtraction problem. Distribute seven number cards to represent the digits in the subtraction problem. A place value chart will be placed on the floor, and students will stand in the correct place value spot.
- Ask the following questions:
 - What are we trying to find out? (*the difference*)
 - What facts do we know? (*Answers will vary.*)
 - What will we do first? (*Subtract the ones. $\{5 - 4 = 1\}$*
Regroup if necessary.)
- Have a volunteer subtract the ones and record the answer on the chart paper. Pick a student to stand as the difference (*1*).
- What is the next step? (*Subtract the tens. Regroup if necessary.*) Sample Response: We need to regroup in the tens place because 7 tens are smaller than 8 tens. To rename 7 tens as 17 tens, we need to trade 1 hundred for 10 tens. (*4 hundreds now become 3 hundreds.*) Pick 3 students (*one to rename 7 tens as 17 tens, another to rename 4 hundreds as 3 hundreds, and one to stand as the difference $\{9\}$*).
- Have a volunteer come to the chart and rename 7 tens as 17 tens and subtract the numbers in the tens place.

- Ask: “What do we need to do now?” (*Subtract the hundreds. Regroup if necessary*). Sample Response: We need to regroup in the hundreds place because 3 hundreds are smaller than 8 hundreds. To rename 3 hundreds as 13 hundreds, we need to trade 1 thousand for 10 hundreds. (*5 thousands now become 4 thousands.*) Pick 3 more students (*one to rename 3 hundreds as 13 hundreds, another to rename 5 thousands as 4 thousands, and the other to stand in as the difference {5 hundreds}*).
- Have a volunteer come to the chart and rename 3 hundreds as 13 hundreds and subtract the numbers in the hundreds place.
- Ask: “What is our final step?” (*Subtract the thousands. Regroup if necessary.*) Sample Response: We renamed 5 thousand to 4 thousand. There isn’t anything to subtract from 4 thousand. Pick one student to stand in as 4 thousand.
- Have a volunteer come to the chart and complete the subtraction problem.
- What is the difference? (*4,591*)
- How can you check to see if you subtracted correctly?

Teacher Facilitation/Student Application

- Have students work in groups of 5 based on a class of 20 students. Each group will receive 10 cards (0-9). Students will play the subtraction game “How Low Can You Go?”
- Mix up the cards.
- Have groups create two 4-digit numbers.
- Take turns. Call out the target number. Students then take cards to create a number close to the target number.
- To score, find the difference between the target number and the number made.
- Try to make the fewest points to win.
- Play five rounds. A different target number will be used for each round. The group with the fewest points wins.
- Ask: What strategies did you use to make the numbers with your cards? (*Answers will vary.*)
- “*How Low Can You Go?*” is adapted from *Math in My World*, McGraw Hill Publishers.

Embedded Assessment

- While students are playing the game, “How Low Can You Go?” observe and record behaviors on Teacher Observation Sheet. Tell the students that you will assess their performance as they complete the activity. Discuss with students the observation behaviors you will be looking for and use the following evaluation method.
 - 2- Students demonstrate a complete understanding of the activity.
 - 1- Students demonstrate a minimal or partial understanding of the activity.
 - 0- Student’s response to the problem is incorrect or incomplete.

Reteaching/Extension

- Give students 8 numbers.
- Have students use those numbers to create 8 subtraction number sentences.
- After students have created the 8 subtraction problems, they will subtract the whole numbers.
- Students will be use the following numbers to create their subtraction problems.
- (218 ; 428 ; 505 ; 835 ; 5,319 ; 4, 268 ; 2, 955; 1,838)

Summative Assessment:

Use Student Resource 7, Assessment, to evaluate student progress.

Authors:

Lori Gonzalez
St. Ambrose Catholic School
Archdiocese of Baltimore

Michelle Friend
Robert W. Coleman Elementary
Baltimore City Public Schools

Students in the Play



Name _____

Date _____

There are 62 students that will perform in the play, “Lion King,” 45 are girls.
How many are boys?

Tickets Sold

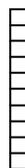
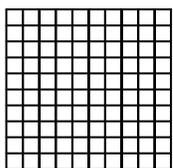


Name _____

Date _____

If 365 tickets were sold for the movie, “High School Musical,” and 275 people attended the show, how could you find the number of people who did not attend the theater?

Actions With Subtraction



First Day of Summer Skating Rink Problem



Name _____

Date _____

The skating rink holds 265 students and 193 people attended the First Day of Summer skating party.

How many more people could the rink hold?

Take Away



Name _____

Date _____

1. The object to this game is to be the first team to remove all the blocks off the mat.
2. Each team starts with 3 one hundred blocks on the mat.
3. Each team has 2 number cubes and will take turns rolling them to create a 2-digit number. (For example, if a team rolls 2 and 4 they may have either 24 or 42. The other teams use the subtraction algorithm to check the work.)
4. A team loses a turn if:
 It makes a mistake in subtraction. Or
 If the number rolls a number greater than what is left.
5. Play continues until one team rolls the exact amount that is left on the mat.

Subtracting Whole Numbers

Name: _____

Date: _____

I. Find the difference.

$$\begin{array}{r} 1.) \ 5 \ 7 \ 8 \\ - \ 1 \ 5 \ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 2.) \ 7 \ 9 \ 8 \ 7 \\ - \ 2 \ 1 \ 7 \ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 3.) \ 3 \ 6 \ 5 \ 9 \\ - \ 1 \ 1 \ 9 \ 2 \\ \hline \end{array}$$

II. Find the missing digits.

$$\begin{array}{r} 4.) \ 9 \ 6 \ 4 \\ - \quad \quad \quad \\ \hline 5 \ 0 \ 5 \end{array}$$

$$\begin{array}{r} 5.) \ 9 \ 2 \ 5 \ 0 \\ - \quad \quad \quad \\ \hline 5 \ 9 \ 7 \ 0 \end{array}$$

$$\begin{array}{r} 6.) \ 8 \ 7 \ 1 \ 6 \\ - \quad \quad \quad \\ \hline 3 \ 8 \ 6 \ 2 \end{array}$$

Brief Constructed Response

Something Is Wrong!

Here is how Carlos found $3,948 - 1,486$.

$$\begin{array}{r} 14 \\ 3, \ 9 \ \cancel{4} \ 8 \\ - 1, \ 4 \ 8 \ 6 \\ \hline 2, \ 5 \ 6 \ 2 \end{array}$$

Explain what the mistake is, and then correct it.

Use words, numbers, and/ or pictures in your explanation.

Teacher Observation Checklist

Student Names	Lion King Problem	Lulu's Problem	Roller Skating Problem	Round Robin Activity	Take Away	How Low Can You Go?
------------------	----------------------	-------------------	------------------------------	----------------------------	--------------	------------------------------

- 0-Student response to the problem is incorrect or incomplete.
- 1-Student demonstrates a minimal or partial understanding of the problem.
- 2-Student demonstrates a complete understanding of the concept.